

Commonwealth of Kentucky
Division for Air Quality
PERMIT STATEMENT OF BASIS

DRAFT

Conditional Major, Construction / Operating

Permit: F-08-033

Lazar Anode Technologies LLC

Hawesville KY 42348

December 3, 2008

Vahid Bakhtiar, Reviewer

SOURCE ID: 21-091-00029

AGENCY INTEREST: 102130

ACTIVITY: APE20080001

SOURCE DESCRIPTION:

The normal baking of anodes in the primary aluminum plant anode baking furnaces results in emissions of sulfur and fluoride compounds due to de-sulfurization and de-fluoridization of the green anodes as they cure in a chamber exposed to atmosphere. Lazar Anode Technologies, LLC has developed a new process to cure green anodes in a totally enclosed vertical column that is sealed to exposure to atmosphere. The new Lazar Anode Technologies process results in no de-sulfurization and no de-fluoridization since the fluoride and sulfur compounds in the green anode are at equilibrium with the packing coke inside the central heating chamber of the totally enclosed vertical furnace chamber. The new design for the anode bake is simply a double wall chamber. The inner chamber contains the green anodes and tightly packed-packing coke. The outer chamber is the combustion chamber where the energy from the "Fuel" is transferred from the outer ring to the sealed inner ring in the top or heating portion of the furnace, and the bottom of the furnace is a cooling section.

In principle, the green anodes are heated in the top of the furnace and cooled in the bottom portion of the furnace. The heating and cooling occurs in the absence of oxygen or exposure of the anodes/packing coke to atmosphere. This concept of heating and cooling the anodes in the absence of oxygen is the technical basis for the new process and results in the release of only trace amounts of organics, sulfur compounds, or fluoride compounds; unlike the traditional anode bake furnaces that release significant amounts of each of the above compounds.

The anode bakes are processed vertically in 10 stations with each process step taking 16 hours. The green anodes start at room temperature, go through a heating and baking cycle that brings the anode to 900-1200° C and cools it back down to room temperature at the bottom of the vertical furnace. The pressure in the sealed inside baking chamber is negative with respect to atmosphere. This negative pressure insures that the VOM release from heating the green anode cannot escape from the inner chamber at either to top or the bottom of the furnace chamber. The VOM is pulled out of the inner chamber at a point in the process where the interior temperature is approximately 200° C. The VOM released during heating of the green anode is withdrawn from the inner ring at a temperature zone where the sulfur compounds and the fluoride compounds will not be in the gaseous phase (200° C or lower). The VOM is then used as the "Fuel" to heat the outer combustion chamber to 1200° C under normal operations. At this temperature in the outer ring combustion chamber, organics will be completely destroyed.

COMMENTS:

The startup emissions are based on 3.0 mmBTU per hour use of natural gas and air emissions based on products of combustion only using US EPA AP42 emission factors. Natural gas combustion at incinerator is assumed to be 1.7 mmBTU per hour. The pilot plant pollutant emission factors have been developed from the operation and engineering observations from a smaller pilot plant operated in Pittsburgh, PA. The maximum processing rate of green anodes is 5,722 tons per year (7,000 hours).

The VOM destruction efficiency in the combustion zone of the anode bake furnace is estimated to be 99.5%. If the chamber temperature exceeds the operation limit, Oven Over Temperature Condition, the VOM will be delivered to the incinerator and VOM destruction will occur in the incinerator. The chamber temperature in the incinerator will be 1500° F and destroy 98% of the VOM. The startup and VOM normal operations will have a common stack to atmosphere at the top of the furnace. The incinerator will have its own stack and be separate from the stack of the furnace.

Applicable regulations

This source is subject to:

1. 401 KAR 59:010, New process operations, applies to particulate matter emissions.
2. 401 KAR 59:020, New incinerator, applicable for incinerators commenced after June 6, 1979 with a charging rate of fifty tons/day or less, applicable to visible emissions.
3. 401 KAR 63:020. Potentially hazardous matter or toxic substances, applicable to emissions of hazardous air pollutants (HAPs), specifically HF emissions.

The Division for Air Quality (Division) did not perform air dispersion model screening of potentially hazardous substances (HF and HAPS quantified using VOM testing data) that may be emitted by the facility as specific emissions information was not available. The Division has conditioned in the permit to test for HF and VOM. The permittee is responsible to speciate the HAPS/toxics emissions information using the test data. Upon start of the equipment, the permittee shall provide us with that information based upon the test data, process rates, material formulations, stack heights and other pertinent information along with modeling using proper EPA approved screening model. Based upon the submitted information, the Division will determine the compliance with the requirements of 401 KAR 63:020.

EMISSION AND OPERATING CAPS DESCRIPTION:

1. PM/PM10, VOC, NO_x, CO, and SO₂ emissions shall not exceed 90 tons per year based on a 12 month rolling total for the entire source to preclude a major source Title V review.
2. Hazardous air pollutants (HAPs), specifically HF emissions shall not exceed 9 tons per year individually and 22.5 tons per year combined based on a rolling 12-month total for the entire source to preclude a major source Title V review.
3. The maximum operating rate of green anodes is 5,722 tons of green anodes processed per year (7000 hours).
4. The total hours of operation per year shall not exceed 7000.

PERIODIC MONITORING:

None

OPERATIONAL FLEXIBILITY:

None

CREDIBLE EVIDENCE:

This permit contains provisions which require that specific test methods, monitoring or recordkeeping be used as a demonstration of compliance with permit limits. On February 24, 1997, the U.S. EPA promulgated revisions to the following federal regulations: 40 CFR Part 51, Sec. 51.212; 40 CFR Part 52, Sec. 52.12; 40 CFR Part 52, Sec. 52.30; 40 CFR Part 60, Sec. 60.11 and 40 CFR Part 61, Sec. 61.12, that allow the use of credible evidence to establish compliance with applicable requirements. At the issuance of this permit, Kentucky has only adopted the provisions of 40 CFR Part 60, Sec. 60.11 and 40 CFR Part 61, Sec. 61.12 into its air quality regulations.